CLAIMS

1.   An image processing system for picking up and displaying an image, the image processing system comprising:

first dividing means for dividing an optical image of an object into a spectrum;

detecting means for detecting the spectrum obtained by the first dividing means and outputting image data based on the detected spectrum;

second dividing means for dividing white light into a spectrum;

extracting means for extracting, from the spectrum of the white light divided into the spectrum by the second dividing means, spectrum portions based on the image data detected by the detecting means;

synthesizing means for synthesizing the spectrum portions extracted by the extracting means; and

projecting means for projecting light formed by synthesizing the spectrum portions by the synthesizing means.

2.   An image processing method of an image processing system for shooting and displaying an image, the method comprising the steps of:

performing a first dividing operation for dividing an optical image of an object into a spectrum;

detecting the spectrum obtained by the first dividing

operation and outputting image data based on the detected spectrum;

performing a second dividing operation for dividing white light into a spectrum;

extracting, from the spectrum of the white light divided into the spectrum by the second dividing operation, spectrum portions based on the image data output by the detecting operation;

synthesizing the spectrum portions extracted by the extracting operation; and

projecting light formed by synthesizing the spectrum portions by the synthesizing operation.

3.   An image pickup device for picking up an image, the image pickup device comprising:

dividing means for dividing an optical image of an object into a spectrum; and

detecting means for detecting the spectrum obtained by the dividing means and outputting a pixel of image data based on the detected spectrum.

4.   The image pickup device according to Claim 3, further comprising:

separating means for separating one line of light forming the optical image of the object and supplying the

separated one line of light to the dividing means; and

focusing means for focusing the optical image of the object onto the detecting means,

wherein the detecting means includes a plurality of photoelectric sensors disposed in a plane for detecting the strength of the light, each photoelectric sensor detecting a spectral component of each pixel of the one line of light.

5.   The image pickup device according to Claim 4, wherein each photoelectric sensor includes an electron shock CCD.

6.   The image pickup device according to Claim 4, wherein the separating means includes a slit and adjusting means, the slit separating the one line of the optical image of the object, the adjusting means adjusting a position where the optical image of the object is incident upon the slit.

7.   The image pickup device according to Claim 6, further comprising focus means disposed just behind the slit for focusing thereon the optical image of the object, wherein the focusing means temporarily focuses the optical image of the object on the focus means.

8.   The image pickup device according to Claim 6, wherein the dividing means includes a prism, and the image pickup device further comprises an optical member causing the light exiting from the slit to be incident upon the prism as parallel light and the spectrum exiting from the prism to exit as converging light to the detecting means.

9.   The image pickup device according to Claim 6, wherein the adjusting means includes a galvano-mirror or a polygon mirror.

10.   The image pickup device according to Claim 6, wherein the adjusting means adjusts the incident position so that the entire optical image of the object is incident upon the slit every first period, and the detecting means outputs the image data every second period.

11.   The image pickup device according to Claim 10, wherein the first period is a vertical scanning period and the second period is a horizontal scanning period.

12.   The image pickup device according to Claim 3, further comprising accumulating means for accumulating the image data output by the detecting means.

13. An image pickup method of an image pickup device for picking up an image, the method comprising the steps of:

dividing an optical image of an object into a spectrum; and

detecting the spectrum obtained by the dividing operation and outputting a pixel of image data based on the detected spectrum.

14. An image display device for displaying an image, the image display device comprising:

dividing means for dividing white light into a spectrum;

obtaining means for obtaining image data based on a spectrum of an optical image of an object;

extracting means for extracting by pixel spectrum portions based on the image data from the spectrum of the white light divided into the spectrum by the dividing means;

synthesizing means for synthesizing the spectrum portions extracted by the extracting means;

projecting means for projecting light formed by synthesizing the spectrum portions by the synthesizing means; and

adjusting means for adjusting a position of projection by the projecting means.

15. The image display device according to Claim 14, wherein the adjusting means includes a galvano-mirror or a polygon mirror.

16. The image display device according to Claim 14, wherein the extracting means includes at least one reflector or transmission unit, the number of the at least one reflector or transmission unit being in correspondence with the number of pixels forming one line in a direction parallel with a line of the optical image of the object and in correspondence with the number of spectrum portions of the optical image of the object for one pixel in a direction perpendicular to the line, the at least one reflector or transmission unit controlling reflection or transmission of the spectrum of the white light on the basis of the image data obtained by the obtaining means.

17. The image display device according to Claim 16, wherein the at least one reflector of the extracting means includes a micromirror or reflective liquid crystal.

18. The image display device according to Claim 16, wherein the at least one transmission unit of the extracting means includes transmissive liquid crystal.

19. The image display device according to Claim 16, wherein the obtaining means obtains the image data every first period, and the adjusting means adjusts the projection position of the light formed by synthesizing the spectrum portions so that a line is successively displaced from another line every first period and one frame of image based on the image data is projected every second period.

20. The image display device according to Claim 19, wherein the first period is a horizontal scanning period and the second period is a vertical scanning period.

21. The image display device according to Claim 16, wherein the dividing means includes a lamp for emitting the white light, a condensing optical system for condensing the white light from the lamp into the form of a line, and a spectral prism for dividing the white light into the spectrum, and wherein the synthesizing means includes a synthesizing prism for synthesizing the spectrum portions extracted by the extracting means.

22. The image display device according to Claim 21, wherein the condensing optical system includes a cylindrical lens or a parabolic sweep mirror.

23. The image display device according to Claim 21, further comprising a first optical member and a second optical member, the first optical member causing the light incident upon the spectral prism or the synthesizing prism to be parallel light, the second optical member causing the light exiting from the spectral prism or the synthesizing prism to be converging light.

24. The image display device according to Claim 21, wherein the extracting means is the reflector, the spectral prism and the synthesizing prism are formed as one prism, and the image display device further comprises separating means for separating light traveling towards the reflector from light traveling away from the reflector.

25. The image display device according to Claim 21, wherein at least one of the condensing optical system and the projecting means is a mirror.

26. The image display device according to Claim 25, wherein the condensing optical system is a parabolic sweep mirror and the projecting means is an elliptical sweep mirror.

27. The image display device according to Claim 26,

wherein a focus of the elliptical sweep mirror is positioned so as to optically correspond with a focus of the parabolic sweep mirror.

28. The image display device according to Claim 26, wherein the light formed by synthesizing the spectrum portions is projected towards the other focus of the elliptical sweep mirror.

29. The image display device according to Claim 25, wherein the condensing optical system is a parabolic sweep mirror and the projecting means is an elliptical sweep half mirror.

30. The image display device according to Claim 16, wherein the dividing means includes a lamp for emitting the white light, a slit for separating in the form of a line a portion of the white light from the lamp, and a spectral prism for dividing the portion of the white light into the spectrum, and wherein the synthesizing means includes a synthesizing prism for synthesizing the spectrum portions extracted by the extracting means.

31. The image display device according to Claim 14, further comprising a cylindrical screen for projecting

thereon the light formed by synthesizing the spectrum portions.

32. An image display method of an image display device for displaying an image, the method comprising the steps of:

dividing white light into a spectrum;

obtaining image data based on a spectrum of an optical image of an object;

extracting by pixel spectrum portions based on the image data from the spectrum of the white light divided into the spectrum by the dividing operation;

synthesizing the spectrum portions extracted by the extracting operation; and

adjusting a position of the light formed by synthesizing the spectrum portions by the synthesizing operation.

33. An image processing apparatus for picking up and displaying an image, the image processing apparatus comprising:

first dividing means for dividing an optical image of an object into a spectrum;

detecting means for detecting the spectrum obtained by the first dividing means and outputting image data based on the detected spectrum;

second dividing means for dividing white light into a spectrum;

extracting means for extracting, from the spectrum of the white light divided into the spectrum by the second dividing means, spectrum portions based on the image data detected by the detecting means;

synthesizing means for synthesizing the spectrum portions extracted by the extracting means; and

shooting means for projecting light formed by synthesizing the spectrum portions by the synthesizing means.